Enabling Accessibility, Affordability and Transparency

October 2023
Munich Re Group

- Founded 1880
- Revenue: € 67.1bn
- Assets under mgt: € 240.3bn
- 41,000 employees

Revenue (in € bn)

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>2022</td>
<td>67.1</td>
</tr>
<tr>
<td>2021</td>
<td>59.6</td>
</tr>
<tr>
<td>2020</td>
<td>54.9</td>
</tr>
<tr>
<td>2019</td>
<td>51.5</td>
</tr>
<tr>
<td>2018</td>
<td>49.1</td>
</tr>
<tr>
<td>2017</td>
<td>49.1</td>
</tr>
</tbody>
</table>

Rating

- A.M Best: A+ (Superior) stable
- Fitch: AA (Very Strong) stable
- Moody’s: Aa3 (Excellent) stable
- S&P: AA- (Very Strong) stable

1. Nos. as of 31st Dec 2022
US holds € 21b of PI market premium making it the world’s largest country in terms of agriculture insurance.

China holds 2nd position in primary agriculture insurance market with € 17b of premium.

India being the top one in terms of rapidly growing markets in agriculture insurance domain with a premium of € 3.5b.

Munich Re Global presence in Agriculture

Strong presence in over 40 countries across the world – top 5 being USA, Brazil, India, China and Thailand.
Agriculture is our wisest pursuit, because it will in the end contribute most to real wealth, good morals & happiness – Thomas Jefferson

Importance of Agriculture Insurance

Farmers
Stability in income, minimal debts, Risk awareness and mitigation

Economy
Raise and secure farm income which generates demand in rural areas and in turn helps in growth of economy

Government
To ensure sustenance of farmers and farming activities which is important for food security

Banks
Farmers timely repay their loans thus lower NPA’s and continuous credit cycle
Role of Technology in Agriculture Insurance

Farmers
- **Smooth** enrolment process
- **Ease** in reporting loss
- **Faster** settlement of claims
- **Better** communication
- **Transparent** processes

Government & Regulator
- **Ease of** monitoring the insurance program
- **Transparency & Efficiency** in the loss assessment
- **Timely implementation** of scheme
- **Long term sustainability** of the Insurance program

Insurance Companies
- **Real time** portfolio monitoring
- **Risk** assessment
- **Increase** farmer enrolment
- **More ground control** and tracking
- **Automated** and **faster** claim payment
## Crop Insurance - Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Coverage</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
</table>
| Yield Protection | Production Loss                    | • Accurate compensation                                                                                                                                                                              | • Assessment of claims require high manpower hence high implementation cost  
• Product development require past yield data at the settlement level thus low accessibility  
• Potential of moral hazard                                                                                                                                                                     |
|                  |                                    | • Flexibility of coverage like pest & diseases, destruction by wild animals can also be covered at various deductible and indemnity levels                                                            |                                                                                                                                                                                                       |
| Revenue Protection| Revenue loss due to increase or decrease in price, low yield or combination of both | • Comprehensive coverage of income                                                                                                                                                                   | • Price risk can only be covered when there is reliable source of price is available  
• High premium cost                                                                                                                                                                              |
| Parametric       | Production Loss due to adverse weather conditions | • Ease of implementation  
• Ease in integration of technology  
• Faster claim settlements  
• Reduced moral hazard  
• More affordable                                                                                                                                                                             | • Basis risk  
• Availability of weather data  
• Limited Coverage  
• Difficulty in Parameter Determination                                                                                                                                                       |
Claims Process

<table>
<thead>
<tr>
<th>Yield Based Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Individual farms</strong> can be assessed based on yield for large farms</td>
</tr>
<tr>
<td><strong>Area-based</strong> yield assessment is done by performing random sample crop-cutting experiments and averages of the samples used for claim settlement.</td>
</tr>
<tr>
<td><strong>Yield estimation using technology</strong> like satellite and weather data to predict crop yield and paying claims based on that data.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Index-based and Double Trigger</th>
</tr>
</thead>
<tbody>
<tr>
<td>A calamity declaration followed by loss assessment. Loss assessment can be by crop-cutting, harvester data, or eye estimates. Eye estimates are generally less reliable &amp; subject to disputes.</td>
</tr>
<tr>
<td>Claim calculation on a pre-defined index of weather or satellite parameters from independent data sources</td>
</tr>
</tbody>
</table>
Challenges

Product Development
- Historical Data
- Pricing
- Basis Risk

Implementation
- Manpower
- Cost
- Data reliability

Accessibility

Transparency and Affordability
To handle the challenges of accessibility, affordability and transparency we developed a suite of solutions which helps from product development to implementation.

**REVA**
- REVA (Risk Evaluation Tool) is a web-based **Primary risk pricing tool**.
- Stochastic calculation of cat loading and heterogeneity instead of a spreadsheet-based deterministic approach.
- Historical yield data is available in the database which is linked to the platform.
- Soft factors i.e. weather forecast, farm management practices, ground-level expertise, and specific risk are also incorporated quantitatively.

**MR Capture**
- Mobile app designed to capture and digitize all the field activities data which are then mapped to the exposure and coverage data to generate a near real-time update on the portfolio.
- Effectively captures activities like Crop health monitoring (CHM), loss surveys (CLS), and yield estimations (CCE).
- Helps insurance companies to manage their manpower efficiently.
- Triggers daily reports for tracking field activities and alerts when the **LR is higher** than expected.

**AgroView**
- A **webGIS-based platform** that utilizes satellite and weather data to monitor in-season crop health, and conduct risk assessments across portfolios based on current and historical data.
- **Exposure mapping** of all key clients to provide analytics customized for their portfolio.
- Fortnightly portfolio performance reports at client and state level.
- Reports present an overall seasonal summary and then detail it up to the lowest administrative level.
AgroView

Satellite and Weather data integration

Interactive visualization of thematic map layers of crop health, crop water stress and weather (drought/flood) indices

In-depth information on various spatial scales - National level to field level information

Crop health monitoring at every 6 days interval, automated report generation at the fortnightly interval - Alerts on anomalies

Time Series Data – From Historic to Current

Precise, timely, and reliable information
Crop Development Indicators

Vegetation Density

Vegetation Health

Moisture Indicator

Precipitation Anomaly

Accumulated Precipitation

Drought Indicator
AgroView is a WebGIS-based crop monitoring platform.
Crop Health Monitoring
Helps in real time portfolio development monitoring

Crop Loss Surveys
Real time Loss surveys monitoring and timely execution as per guidelines

Crop Cutting Experiment
Helps in real time Loss Ratio estimation and judicious decision making

Farm Georeferencing
All activities are recorded with Geotagged field polygon that helps in satellite based data analysis

Manpower Tracking
Ground manpower productivity analysis and Vendor Management

Data Analytics
Decision Support System to monitor Loss Ratio in real time to minimize the fraudulent activity
MR Capture: CHM Report

Clients - 4
App Users > 7k
Data collected >900k
Covered: 8 States, 79 Districts, 707 Sub-Districts

CHM Crop Health
- Very Good: 18%
- Good: 44%
- Average: 30%
- Poor: 9%
- Very Poor: 2%

State wise Crop Health
- Maharashtra
  - Very Good: 2.50 Cr.
  - Good: 2.20 Cr.
  - Average: 9.75 Cr.
  - Poor: 12.35 Cr.

Crop wise Health
- Soybeans (Bharat): 0 Cr.
  - Very Good: 1.14 Cr.
  - Good: 2.97 Cr.
  - Average: 1.37 Cr.
  - Poor: 1.27 Cr.
  - Very Poor: 0.27 Cr.
  - Not Surveyed: 0.97 Cr.

- Paddy (Bharat): 0 Cr.
  - Very Good: 1.45 Cr.
  - Good: 7.63 Cr.
  - Average: 0.35 Cr.
  - Poor: 0.52 Cr.
  - Very Poor: 0.01 Cr.
  - Not Surveyed: 0.52 Cr.

- Green Gram (Massa): 0 Cr.
  - Very Good: 0.82 Cr.
  - Good: 0.86 Cr.
  - Average: 0.42 Cr.
  - Poor: 0.40 Cr.
  - Very Poor: 0.02 Cr.
  - Not Surveyed: 0.02 Cr.

- Cotton (Gopalganj): 0 Cr.
  - Very Good: 0.79 Cr.
  - Good: 0.78 Cr.
  - Average: 0.20 Cr.
  - Poor: 0.40 Cr.
  - Very Poor: 0.02 Cr.
  - Not Surveyed: 0.02 Cr.

- Groundnut (Pux Not): 0 Cr.
  - Very Good: 0.35 Cr.
  - Good: 0.30 Cr.
  - Average: 0.10 Cr.
  - Poor: 0.02 Cr.
  - Very Poor: 0.01 Cr.
  - Not Surveyed: 0.01 Cr.

- Other: 0 Cr.
  - Very Good: 0.97 Cr.
  - Good: 1.60 Cr.
  - Average: 1.37 Cr.
  - Poor: 0.14 Cr.
  - Very Poor: 0.01 Cr.
  - Not Surveyed: 0.14 Cr.
Clients - 4

App Users > 7k

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Portfolio Summary

CCE Surveys Progress
(Loss/No Loss reported)

Claim Amount (Cr)

Loss Ratios (%)
(Actual/Expected)
Future Vision

Integration of AgroView and MR Capture
- Integration of AgroView and MR Capture application for mutual data exchange
- Satellite based & field augmented crop loss assessment
- Field level historical crop information and validation

Crop Yield Estimation
- Collected data will be used to estimate the field level crop yield from the satellite data
- Crop acreage estimation

Field Level Crop Loss Assessment
- Development of Field level crop loss assessment product
- Loss assessment using ML and deep learning model through Remote Sensing data
- Historical database would help in designing and pricing of product

Historical Data Repository
- Ground truth database will help in designing of New satellite index based insurance products.
- Database will help in pricing, loss trend analysis
Thank You...!!